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A Redetermination of the Atomic Weight of Zinc and Cadmium.

Dissertation
submitted to The Board of University Studies of The Johns Hopkins University for The Degree of Doctor of Philosophy
by
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[illegible]

The author was brought to its highest

*(Amer. J. Sci. XLI. 231. (1891)) found that
copper oxide gave off gas in a vacuum.
[illegible]
[illegible] atomic weight determinations. Inasmuch
as it touches the work done in this Uni-
versity, and, more especially, because it would
change the figures which Dixon and
Burton had [illegible]
[illegible]
permit of a correct determination of the
evolved gases.
The method used by Edwards, which was
[illegible]
[illegible]
[illegible] obtained for atomic weight
[illegible] the Chemistry Department [illegible]

may not be out of date before finishing

Authorship!

(c) The con-

(d) The conversion

4, The Construction of the Resistance Coil

of the electrical equipment

determination of the

specific (Richards and

1883. Pélorge and Trémy – C. rend. de l'Acad. 5-5 ... 65:04

1883. Berthelot – Comptes Rendus ... 65:41

1883. [illegible]

1885. Van de Vaate – Comptes Rendus. C. 5-5 ... 65:34

1887. [illegible] – [illegible] I, I ... 65:67

1887. Rowe and Burton – [illegible] II 30 ... 65:2[illegible]

1887. [illegible]

1887. [illegible]

1887. Richards – [illegible]

1887. [illegible] ... 65:956

Rowe and Burton in their consideration of the 1, The Evaporation of the River. 2, The [illegible] 3 [illegible]

closed end of a hard glass combustion tube which has been divided into three compartments by drawing the original tube at two points by means of a red hot [illegible] in the furnace. Only the material which in the middle compartment was observed [illegible]

and every
taken against
rendered every
platinum dish

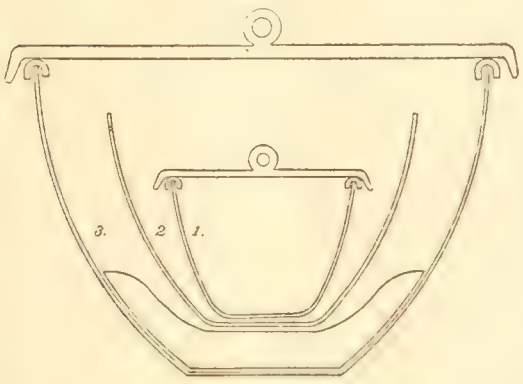
red heat with vapours of ammonium chloride to remove iron.

Either hydrochloric acid or platinum, no distinctly visible residue was found, but a yellowish coloration, doubtless due to evaporation in the air, which was accurately with ammonia

The Arrangement for Crucible 1.

The glaze was removed from the lids of the crucibles and from the lower part of the inner crucible for 2 in figure 1. This was done with Tungsten carbide grit, and care being exercised.

FIG. 1.



and afterwards in boiling water. Figure 1 shows the arrangement. 1 is a small crucible (0.0) in which the

[illegible]
[illegible]
grooves from the edge of the crucible -
[illegible] (II) [illegible]
which rests on a refractory support in
the bottom of [illegible]
(II) [illegible]
[illegible]

[illegible] of Crystals.

After the [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
did not exceed one-tenth of a milligram.
The pairs were now transferred to the
[illegible]
[illegible]

and heard in the temple. Now, this course
was well known to the chief priests

of the Operators Head, Survival Tool Light.

[illegible]

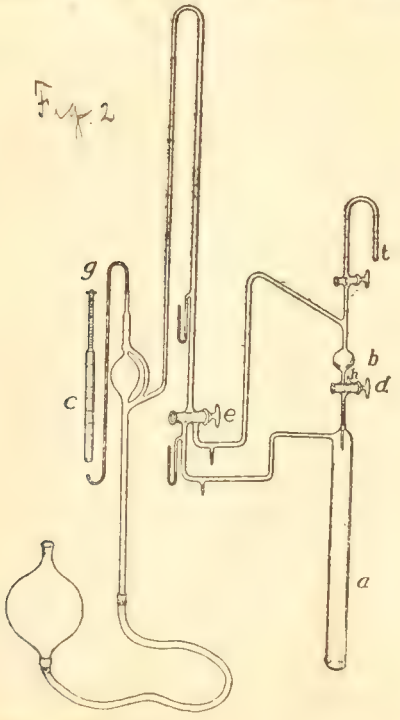
From the above statement it is seen that

sometimes $\frac{1}{5}$ to $\frac{1}{25}$ of a milligram indicating

IV

Apparatus

Fig. 2



to the grain of the cross-pieces to which they were fastened - the cross-pieces would be pressed back so that the grain would be parallel to that of the long pieces giving the support. All this is necessary to permit the opening of the frame & the closing of the sides. The operation is performed by turning the handle of the press. Upon this handle is a paper wheel which runs between blocks of wood. The edges of the sides of the frame rest upon these blocks & when the handle is turned the wheel presses the sides down. The bookpress has the necessary pressure & the adjustment of the operation. The pressure necessary depends upon the number of sheets in the book & the thickness of the sheets. (When one sheet can be folded several times) Care must be taken not to crease the delicate skin.

The oxide in the acid. The acid returning
showed an titration 364.9 c.c. of N/10 Na.
[illegible]
by dext. per ten cent. It was
required two hours to collect the complete evolution
of a specimen of the oxide; in this case,
[illegible] only four hours [illegible]
[illegible] the oxide, sample of the
[illegible] 5.1 [illegible] the
[illegible]. In the acid returning
[illegible] the oxide [illegible]
[illegible] the determination.

Mode of Procedure.

The apparatus [illegible] the
[illegible] first [illegible]
[illegible] the [illegible] the two chambers
[illegible] and the "oxide train". The first chamber
[illegible] is removed the air which remained
in the [illegible] [illegible]
being [illegible] [illegible]
[illegible] [illegible]
[illegible] [illegible]

[illegible]

was watched by means of the [illegible] [illegible] portion of the tube "g". The vibration of the [illegible] indicate that of the [illegible] working [illegible] the pump, 400 c.c. being compressed into $\frac{1}{2}$ c.c. The [illegible] [illegible] ing for twenty-four hours. The oxide was [illegible] the [illegible]; in every case the result was negative. [illegible]

in the apparatus. upon the

7. The

2 are then added. The upper

0.

. Upon. Lining it with

at the [illegible] of paper to insure

[illegible] of the gases collected, [illegible] paper.

The eudiometer [illegible]. The gases were [illegible] the gas-analysis [illegible] precautions taken [illegible] gases. [illegible] adjusted thermometers were employed to [illegible] the temperature. These instruments were graduated to tenths of a degree. [illegible] of different observations were made. [illegible] readings were taken with [illegible] scope at different times during the day, the operator [illegible] minute at these times.

VI. Analyses of the Gases.

[illegible]

A few preliminary samples of these gases [illegible] reason to believe, we should [illegible]

[illegible] [illegible] absorbed [illegible] at [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
oxygen current.

The electrolysis of [illegible] was [illegible] [illegible] [illegible] apparatus [illegible] [illegible] tested each time [illegible].

Apparatus [illegible] [illegible] [illegible] [illegible]

[illegible] accompanying [illegible] figure [illegible] [illegible] apparatus which was found convenient for keeping the [illegible] [illegible] [illegible] [illegible] examination.

Fig 1

I						65:459
II						65:445
III	1.06519					65:459
IV	1.05892					
V	1.26018					
VI						
VII						
VIII						

Average = 65:028
Total diff. = .042

Average
Total diff. =

Black Mountain Series

I			
II			

I	0.314 c.c.	II	0.258 c.c.
III	0.329 c.c.	IV	0.315 c.c.
V	0.312 c.c.	VI	0.237 c.c.
VII	0.315 c.c.	VIII	0.329 c.c.

	.42 cc.	3.9	$CO_2 = 0.0\%$ $O_2 = 16.9\%$ $N_2 = 83.1\%$	1.317	5.25 cc.	3.98	$CO_2 = 0.0\%$ $O_2 = 18.5-8\%$ $N_2 = 81.42\%$
	.42 cc.	4.3					
	.4 cc.	4.3	$CO_2 = 0.0\%$ $O_2 = 24\%$ $N_2 = 76\%$	1.326	5.4 cc.	4.3	$CO_2 = 0.0\%$ $O_2 = 8.42\%$ $N_2 = 81.58\%$
	.42 cc.	4.4					

[illegible]

Einw. d. Salze anorg. Säuren auf Cadmium.

1858	Schneider. (Schweigger Journ. 22, 336)	$CdCl : CdO.$	111.483
1857, 58	Kühn. (Journ. f. prakt. Chem. 72, 338)	$CdSi_4 : CdS.$	111.935
1859	Ullmann. (Ann. Chim. Phys. [3], 55, 158)	$Cd\,C_2 : Cy.$	112.476
	2nd series	$Cd\,C_2 : 2Cy.$	112.007
1860	Jensen. (Journ. f. prakt. Chem. 79, 281)	$Cd\,C_2O_4 : CdO.$	112.043
	Kuhlmann. (Ann. Chim. phys. [3] 28)		
1890	Partridge. (Amer. Journ. Sci. [3] 40, 377)	$Cd\,C_2N_4 : CdO.$	111.846
	2nd series	$CdSO_4 : CdS.$	111.727
	3rd series	$Cd\,C_2O_4 : CdS.$	111.610
1892	Bruce and Jones.	$CdCl : CdO.$	112.0706
1894	Spencer and Smith.	$CdO : Cd.$	112.055
		$Cd\,C_2N_2 : CdO$	111.85
		$Cd : CdO.$	112.38
		$Cd\,Cl_2 : 2AgCl.$	112.59
		$Cd\,Br_2 : 2AgBr.$	112.35

the tile seemed to be corroded by [illegible]
([illegible] [illegible] [illegible] [illegible] [illegible] the
under surface of the tile. See page 16).

Furthermore, there was clear evidence
of [illegible] on the under surface of
the tile. On weighing, we [illegible]
[illegible]
were never able again with [illegible]
[illegible]
constant weight. Two experiments gave
these weights for the oxide:

	1.	2.	3.	4.	5.
I.	1.502456,	1.502112,	1.502001,	1.501628,	1.501425
II.	[illegible]	1.430388,	1.430165,	1.429923,	1.[illegible]

[illegible]
[illegible]
it between the melting-point of pure silver
[illegible]
sulphate about 1066° * (Hannay and Deville).
We turned back, therefore, to the [illegible]
[illegible]
a temperature between the fusing-point
[illegible] [illegible]
i.e. 775°-838°, ([illegible]
[illegible] [illegible] [illegible] [illegible]

[illegible] is in water under the lid
of the receiver. It is put in wet.

[illegible]

[illegible] 27 . [illegible]

receiver on its side, [illegible]

and rise slowly until it just reaches
[illegible] Remove receiver, [illegible] 36

[illegible]

[illegible] mixed cadmium [illegible] with similar results. Since their work Crum (Annals-Rept. C. Chem. 13, 61 (1876); 8, 92) attempted [illegible] by passing [illegible] and iron sulphate [illegible]

[illegible] at 90°, about Zinc-Oxide at 120°, and [illegible] the Oxide [illegible]

[illegible] Oxide is not at all discernible at 75° [illegible] with [illegible]

Moreover it was considered very important of oxides of nitrogen in the [illegible] and Bunsen, to our oxide, the following [illegible]

Satz	Cadmium	Zink				
I	1.364861	1.55[illegible]77	112.071			
II.	1.679348		112.074			
III.		1.696195				
IV.	1.512948		112.112			
V.						
VI.	1.438035	6482				
VII.	1.44044.0	1.646037	112.079			
VIII	.45[illegible]384					
IX						

Dimanche.